BIOLOGY AND ECOLOGY OF ORIENTAL TERMITES (ISOPTERA)

No. 3. Some Observations on *Neotermes gardneri* (Snyder) [Family Kalotermitidae]

BY

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(*With a text-figure and 2 plates*)

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I. Introduction

The large and primitive termites belonging to the family Kalotermitidae often bore into dry wood and rotten wood in standing trees, houses etc., and cause considerable damage. The galleries are large and go deep into the wood, not excluding the heartwood, and look like the galleries of beetle borers but are distinguishable from the latter by the fact that portions of the irregular galleries are filled with brownish masses made up of the small, semi-cylindrical and rugose excretory pellets cemented together by salivary or other secretions into irregular masses. Sometimes, as in the dry wood form, *Cryptotermes* spp., the loose pellets may lie outside the bored part of the wood.

Only a few species of *Neotermes* are known to attack living trees, the rest attacking dead or rotten wood. Among the former are the following: *Neotermes tectonae* (Damm.) of Java bores living teak trees (*Tectona grandis*) in Java and is a serious pest, causing swelling and canker formation on the trunk; it occurs on several other hosts also (Dammerman,

1915 and Kalshoven, 1930). *Neotermes greeni* (Desn.), *N. militaris* (Desn.) and *N. militaris* var. *unidentatus* (Kem.) of Ceylon bore the heartwood and even roots of the tea plant, *Camellia sinensis* (Linn.) O. Kuntze, eating the plant hollow and ultimately killing it. (*vide* Pinto, 1941, pp. 80–81).

Sometime ago we found the Indian species, *Neotermes gardneri* (Snyder), which has already been recorded as boring dead, rotten branches of mango, *vide* Snyder 1933; Beeson, 1941 boring *living* portions of trees in Dehra Dun (U.P., *ca.* 2,000 ft.) in addition to the dead ones. As nothing is known of the biology and ecology of the species, some observations made on the nature of damage, the season of the emergence of alates etc., are described here; records in the ledger files pertaining to the earlier collections are also summarised.

II. Observations

1. Host-plants (Table 1)

The five host-plants so far recorded, all at Dehra Dun (U.P.), are mentioned briefly in Table 1, and fuller details are given below:

Table 1—Host-plants of *Neotermes gardneri* (Snyder)

Botanical name and Family	English name	Vernacular name (Hindi etc.)	Locality	Remarks
1. *Artocarpus lakoocha* Roxb. (Fam. Urticaceae).	—	Barhāl; dehū.	Dehra Dun (Western Himalayas, U.P.), *ca.* 2,000 ft.	In dead wood.
2. *Litsaea polyantha* Juss. (syn. *Tetranthera monopetala* Roxb.) (Fam. Lauraceae).	—	Karkáwa; Singram	,,	In rotten log.
3. *Mangifera indica* Linn. (Fam. Anacardiaceae.)	Mango.	Ám.	,,	In dead branches.
4. *Pterospermum aceri-folium* Willd. (Fam. Sterculiaceae).	—	Kanak-champá; mayeng.	,,	In both dead wood and adjoining *living* wood in thick (24-inch girth) branches.
5. *Woodfordia fruticosa* (L.) Kurz. (syn. *W. floribunda* Salisb.) (Fam. Lythraceae).	—	Dhaulā	,,	In dead trunk of fallen tree, at *ca.* 18-inch girth.

The initial specimens (alates and nymphs) from which Snyder (1933, p. 4) described the species, were collected in April, 1931, in Dehra Dun (U.P.) from a rotten branch of mango, *Mangifera indica* Linn., about 12 feet from the ground. More specimens (soldiers, alates and nymphs) were collected from mango trunk in Dehra Dun on 4th July, 1932, when a field note was recorded that 'the main trunk of tree was apparently healthy'. Again, specimens (including the queen, some soldiers and several nymphs) were obtained from the same place on 19th April, 1953, inside the wood of a half dried branch of living mango tree. On 4 February 1940, some soldiers and nymphs were obtained from galleries in a rotten log of *Litsaea polyantha* Juss. in New Forest, Dehra Dun. On 3rd March, 1940, a soldier and some nymphs were obtained from a dead log of *Artocarpus lakoocha* Roxb. in Dehra Dun, and later on (no date recorded) some alates were obtained from the same source. On 26 February 1954, in New Forest, Dehra Dun, a dead branch of a large healthy tree (height 100 ft.; girth at 4½ ft., 15 in.) of *Pterospermum acerifolium* Willd. was found heavily bored by the species, several soldiers, alates and nymphs being collected. The infested branch was about 2 ft. in girth; when cut it was found that the healthy, *living* portion of the branch adjoining the dead portion was also attacked by the termite; the tree did not show any sign of weakness. Again in New Forest, Dehra Dun, on 27 January 1955, a one-foot girth main trunk of a fallen, dead tree of *Woodfordia fruticosa* (L.) Kurz (syn. *W. floribunda* Salisb.) was found attacked, at about 2 feet from the ground, and some soldiers, alates and nymphs were obtained.

2. Nature of Damage (Pls. 1 and 2)

As stated above, while generally dead or half-rotten wood is attacked, when this portion adjoins the healthy living portion of the branch or trunk the attack passes into the healthy portion also. No death of host trees has so far been reported. In the laboratory a part of the bark of *Pterospermum acerifolium* branch was also eaten up.

The termite makes an irregular network of large interconnected, flattened galleries which lie mostly in the centre (i.e. in the heartwood in some species), leaving the peripheral sapwood comparatively unaffected. In a *Pterospermum* piece the network consisted of flattened galleries of diameters in cross-section about 30 mm. or over × 2–4 mm. (Pl. 2, figs. 1 and 2); sometimes, larger excavations are made.

3. Faecal Pellets

(Pl. 1, fig. 6; and text-fig.)

The galleries are usually filled with brownish masses composed of the tiny pellets of excreta cemented together, along with a little wood dust, probably with the aid of the salivary secretion. These masses are bored through with a few small galleries for the passage of termites and can be easily crumbled to a powdery, granular mass if gently rubbed between the fingers and the thumb. The masses are sometimes as large as 3 × 4·5 cm. in size, the actual size depending upon the dimensions of the gallery or cavity in which they are lodged.

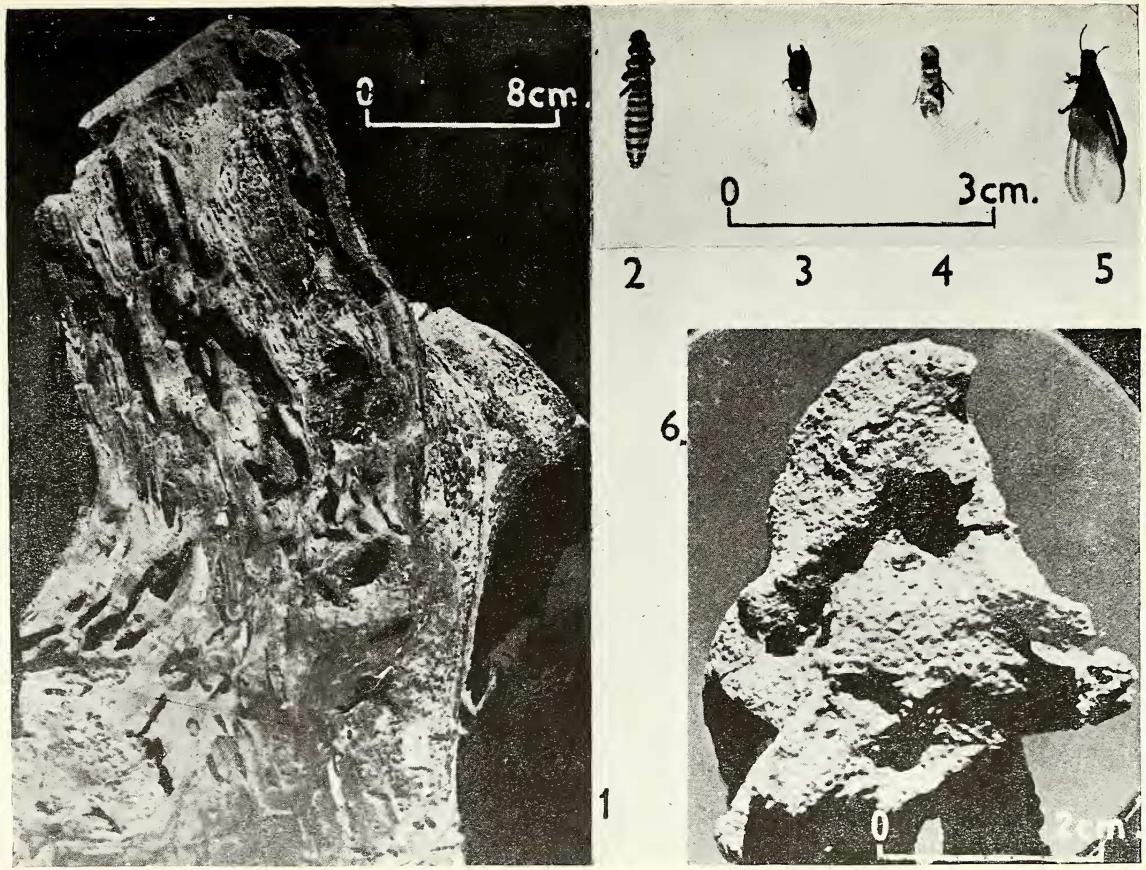
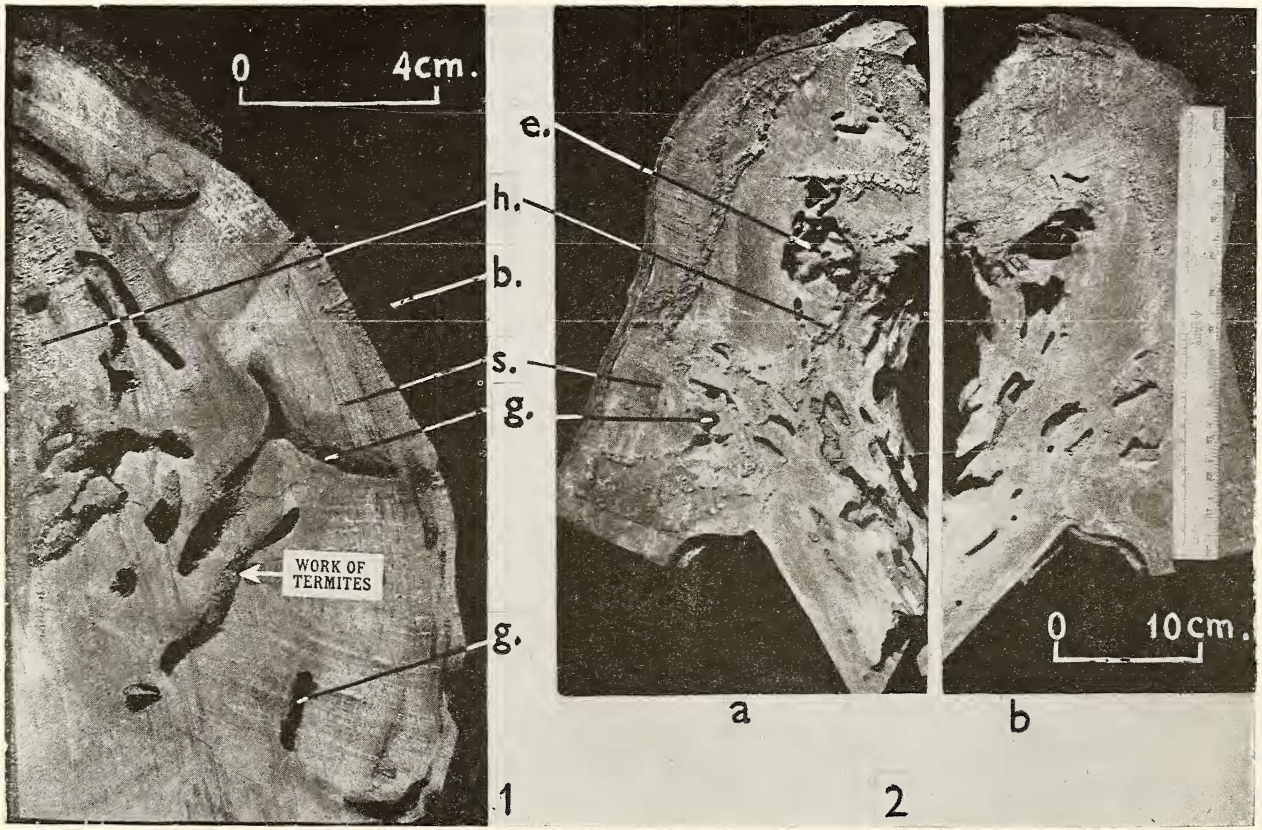


FIG. 1. Surface view of a branch of *Pterospermum acerifolium* Willd. attacked by *Neotermes garaneri* (Snyder).

FIGS. 2–5. Various castes of *Neotermes gardneri* (Synder). (2) Queen. (3) Soldier. (4) Nymph. (5) Alate.

FIG. 6. A disintegrated faecal mass of *Neotermes gardneri* (Snyder) taken from a wood-cavity in a branch of *Pterospermum acerifolium* Willd.

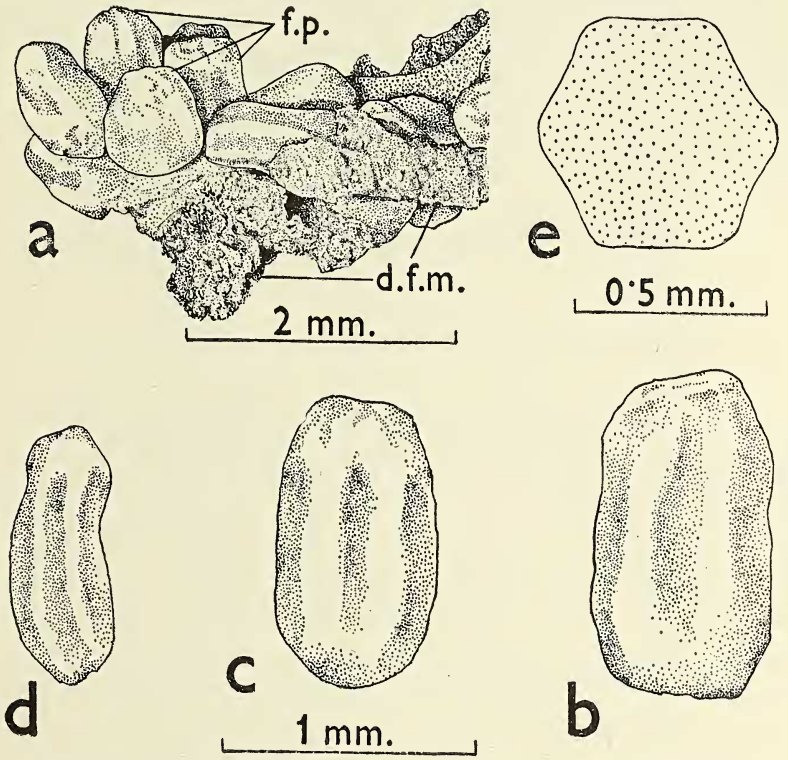


Lettering : *b*. bark ; *e*. mass of faecal pellets ; *g*. termite galleries ; *h*. heartwood (?) ; *s*. sapwood.

FIG. 1. Transverse section of a branch of *Pterospermum acerifolium* Willd., showing galleries of *Neotermes gardneri* (Snyder).

FIG. 2 (*a*, *b*). Ditto, in longitudinal sections.

It is probable that these masses, being hygroscopic, function as reservoirs of moisture and thus serve to condition the humidity inside the galleries.



TEXT-FIG. 1. Faecal pellets of *Neotermes gardneri* (Snyder). The pellets form masses which fill the cavities in wood made by the termite.

(*a*) A mass of faecal pellets cemented together. Note that some pellets have not completely disintegrated but have retained the original form. (*b*)–(*d*) Surface views of three faecal pellets. (*e*) Transverse section of a faecal pellet.

d. f. m. disintegrated faecal mass ; *f. p.* faecal pellets adhering to each other.

The faecal pellets are tiny, reddish brown and sub-cylindrical and with 6 weak but distinct longitudinal ridges on the surface, giving a distinctly hexagonal appearance in cross section. The size of individual pellets varies considerably— length *ca.* 0·9–1·14 mm. ; diameter *ca.* 0·5–0·7 mm.

4. Castes so far known

(Pl. 1, figs. 2–5)

The castes so far recorded are: soldiers, alates (fully-winged males and females, and queen), and nymphs. As in the other Kalotermitidae, the worker caste is wanting, the function of workers being performed by the older nymphs.